Rapid Ecological Assessment of Forest Cover and Fire Effects at Driggs River Road Prescribed Fire (2014)

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Objective

The objective of this sampling was to provide an assessment of fire effects on vegetation resulting from the prescribed fire of August 5th, 2014. Plot establishment and data collection occurred on the 18th and 22nd of August, 2014. The treatment area consisted of mixed-pine, with a young aspen (*Populus* spp.) and pine understory. The site was harvested in the summer of 2010 and chipping of some of the slash occurred in that treatment. Harvesting focused on removing jack pine (*Pinus banksiana*) and releasing red pine (*P. resinosa*) and white pine (*P. strobus*).

Methods

We established six transects west of Driggs River Road, each of about 500 yards in length and containing three plots equidistant from one another (see Map 1). A total of 18 plots were established: seven were in the northernmost area outside of the prescribed fire burn unit; vegetation did not burn in these plots. Transects were established at varying distances from the Driggs River Rd. and the Driggs River to capture the varied effects and heterogeneity of the burn. Aerial photos were used to determine the general transect direction and the GPS coordinates (DD, NAD83) of each plot center.

Circular plots of 0.025 ac (1/40th ac) were established, each with a radius of 18.4 ft, using the closest tree as the plot center. Three sub-plot transects were established for use in measuring coarse woody debris (CWD): one transect at 0 degrees, one transect at 135 degrees, and one transect at 225 degrees, all with respect to plot center. One length of rope was used to lay out the sub-plot transects. At each plot, a photo was taken facing north from plot center and four densiometer measurements were taken from plot center facing north, east, south, and then west. For each tree (defined as a woody stem ≥5 in diameter breast height or DBH) the species, DBH, status (alive or dead), and crown class (dominant, co-dominant, intermediate or suppressed) were recorded. For those trees that burned, the maximum scorch height and percent of the live crown that burned were also estimated. For coniferous tree species, if was noted if the individual was currently bearing cones. Saplings (defined as a woody stem between 1 in and 5 in DBH) were counted by species within ¼ of each 0.025 ac plot, rotating which ¼ area was counted from plot to plot. For example, if starting at Plot 1 and measuring the number of saplings in the NE ¼ area, then at Plot 5 one would be back to the NE ¼ area to measure again. If CWD was intersecting a sub-plot transect, the following measurements were recorded: tree species, diameter at the small end of the CWD (no less than 5 in), diameter at the large end of the CWD, length from the small end to the large end, and decay class. CWD was measured along each sub-plot transect only if: 1) the central axis of the piece intersected a transect, 2) the diameter at the small end was ≥5 in, 3) the piece was at least 3.3 ft (1 m) long, 4) the piece was in decay class 1-4, not 5. For each plot, the percent of the plot that burned was estimated using the following ranks: 0 (not burned), T (trace), 1 (1-5%), 2 (6-25%), 3 (26-50%), 4 (51-75%), 5 (76-95%) or 6

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(96-100%). If the plot area was within 150 ft (50 m) of the burn this was noted, and if slash was visible from any place from within the plot area this was noted. Lastly, a recording of a Black-backed Woodpecker (*Picoides arcticus*) was played over a portable speaker at each plot, followed by a 90-second rest period to listen for any response. If Black-backed Woodpeckers were present and responded to the recording, the number of individuals was recorded. These playbacks were done at each plot on two occasions. The first round was on either 18 August 2014 or 22 August 2014. The second round of playbacks was done on 8 September 2014. More on field methods can be found in the 2014 *Forest Rapid Ecological Assessment Manual* by G. Corace and H. Petrillo (see ServCat). Data reside in Excel format at Seney NWR.

Results

For this report, 11 plots were analyzed as "burned" and the remaining seven plots were analyzed as "unburned." One plot residing just outside of the burn area was within 150 ft of the burn, but was still analyzed as an unburned plot. Overall, 10 tree species were observed across the 18 plots, in the form of overstory, midstory, and/or coarse woody debris (Table 1). In the overstory alone, seven trees species were observed across all plots, including black spruce (*Picea mariana*), jack pine, red pine, white pine, red maple (*Acer rubrum*), bigtooth aspen (*Populus grandidentata*), and quaking aspen (*Populus tremuloides*). Only four of these (jack pine, red pine, white pine, and quaking aspen) were present in the burned plots. One snag (as defined as a tree dead prior to the burn) was observed over all plots sampled and was present in one of the unburned plots. Three total pieces of coarse woody debris were measured across all 18 plots, with two in an unburned plot and one in a burned plot.

Both number of trees per acre and basal area (ft^2) per acre were greater in burned plots than in unburned plots (Table 2). The number of saplings per acre was also greater for the burned plots and species composition of the saplings differed somewhat between burned and unburned plots (Table 1, Figure 1). Slash was visible at all but one of the 18 plots, and the plot without it visible was within the burned area (Table 2). For burned plots, the mean percentage of plot burned was 96.4% (±3.8) and the mean percent of live crown that burned was 49.9% (±42.3). With respect to the percentage of live crown that burned, the results appear to be bimodal (Figure 4): 42.3% (11/26) of trees had less than 20% of live crown burn and 34.6% (9/26) had greater than 80% of live crown burn with only 23% (6/26) of trees having between 20% and 80% of live crown burned. The overall mean scorch height was 67.8 (±60.3) inches, which equates to approximately 5.6 ft (Table 2). Red pines were recorded with the highest maximum scorch heights; no other species, with the exception of one white pine, had maximum scorch heights that were greater than six feet. When split up according to transect, Transect 5 had the highest mean percent live crown burned and yet had the lowest mean maximum scorch height (Figure 6, Table 5). One plot had a Black-backed Woodpecker that responded to the recording. It was determined to be an adult female and was present at Plot 8, which is along Transect 4.

Table 1. Tree species encountered in the form of overstory, midstory and/or coarse woody debris (CWD). A X signifies the species was present in an unburned plot and a + signifies the species was present in a burned plot.

			Overstory	Midstory	CWD
12	Balsam fir	*Abies balsamea*		+	+
95	Black spruce	*Picea mariana*	X		
105	Jack pine	*Pinus banksiana*	X +	X +	X
125	Red pine	*Pinus resinosa*	X +	+	X
129	White pine	*Pinus strobus*	X +	+	
316	Red maple	*Acer rubrum*	X	X +	
375	Paper birch	*Betula papyrifera*		X	
741	Balsam poplar	*Populus balsamifera*		X	
743	Bigtooth aspen	*Populus grandidentata*	X	X +	
746	Quaking aspen	*Populus tremuloides*	X +	+	

Table 2. Summary of characteristics for 0.025-acre plots that were burned versus unburned.

	UNBURNED PLOTS (7)	BURNED PLOTS (11)
Number of tree species sampled	7	4
Mean number of trees per acre (±SD, range)	85.7 (±58.6, 40-200)	101.8 (±65.4, 0-200)
Mean basal area (ft^2) per acre (±SD, range)	45.6 (±46.8, 7.9-114.6)	77.0 (±65.1, 13.6-198.5)
Mean diameter at breast height (inches ±SD, range)	8.8 (±4.6, 5.0-19.9)	9.8 (±5.5, 5.0-21.1)
Mean percent canopy closed* (±SD, range)	56.1 (±31.5, 20-86)	68.1 (±30.2, 37-91)
Mean crown class (±SD, range)	2.1 (±1.0, 1-4)	2.4 (±0.9, 1-4)
Mean number of saplings per acre (±SD, range)	160 (±244.4, 0-640)	261.8 (±279.6, 0-800)
Percentage of plots with coarse woody debris (CWD)	14.3% (1/7, 2 pieces)	9% (1/11, 1 piece)
Percentage of plots with slash visible	100% (7/7)	90.9% (10/11)
Percentage of coniferous trees with cones present	83.3% (10/12)	63.6% (14/22)
Mean percent of plot burned (±SD, range)	0%	96.4% (±3.8, 85-97.5)
Mean scorch height in burned plots (feet ±SD, range)	NA	5.6 (±5.1, 0.1-20)
Mean percent of live crown that burned (±SD, range)	0%	49.9% (±42.3, 0-100)

*percent canopy closed measurements could be high because densiometer readings were taken from plot center, which was always a tree or sapling.

Table 3. Number of coniferous trees with or without cones within burned plots. 24 total coniferous trees observed in these plots.

Burned plots		
	# trees with cones	**# trees without cones**
Jack Pine	1	0
Red Pine	13	1
White Pine	1	8
Total	15	9

Figure 1. Saplings per acre by species for unburned and burned plots.

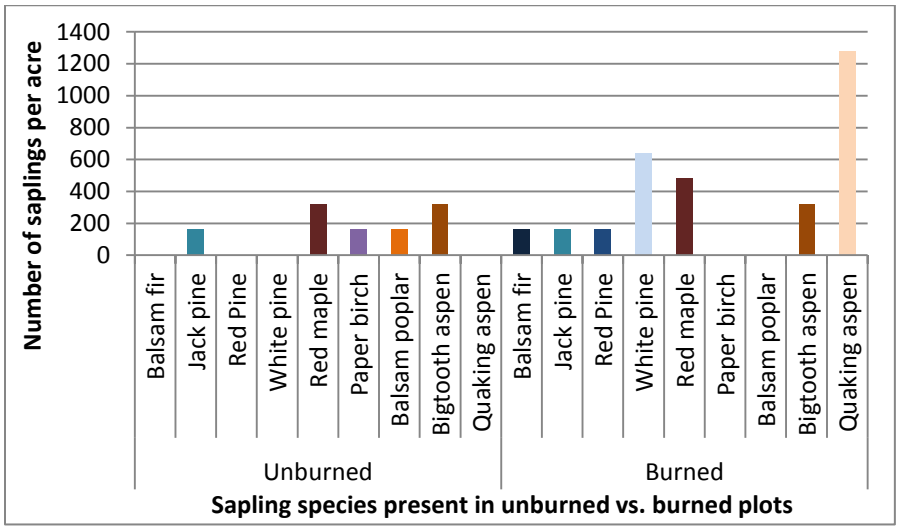


Table 4. Saplings per acre by species in burned plots that completely burned versus those that have some green foliage left on them.

Species	**Saplings per acre that burned 100%**	**Saplings per acre that have some green foliage left**
Balsam fir	160	0
Jack pine	160	0
Red Pine	160	0
White pine	0	640
Red maple	480	0
Bigtooth aspen	320	0
Quaking aspen	1120	160
Total	2400	800

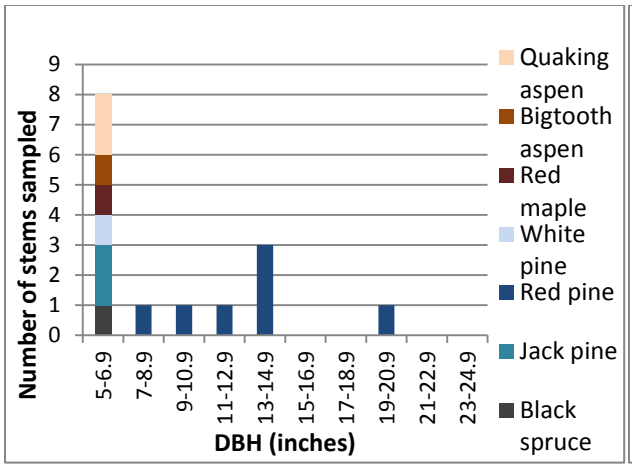


Figure 2. Size classes of trees encountered in unburned plots.

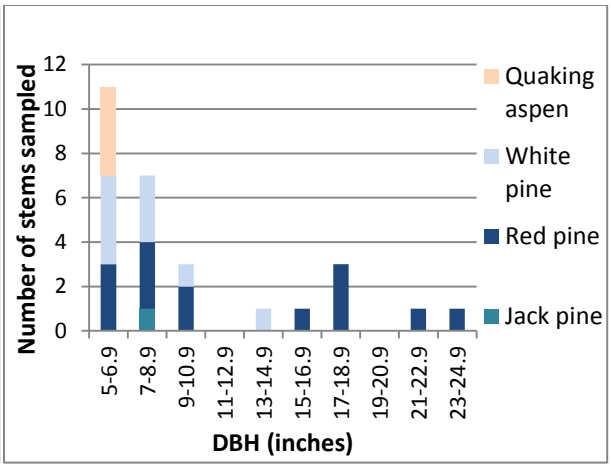


Figure 3. Size classes of trees encountered in burned plots.

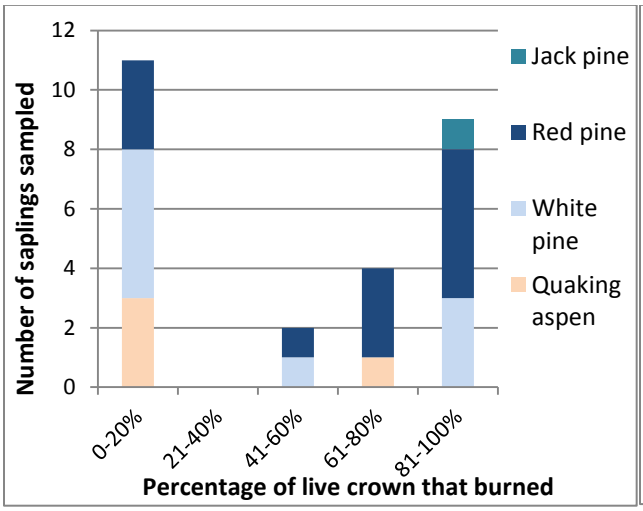


Figure 4. Percentage of live crown that burned by tree species for burned plots.

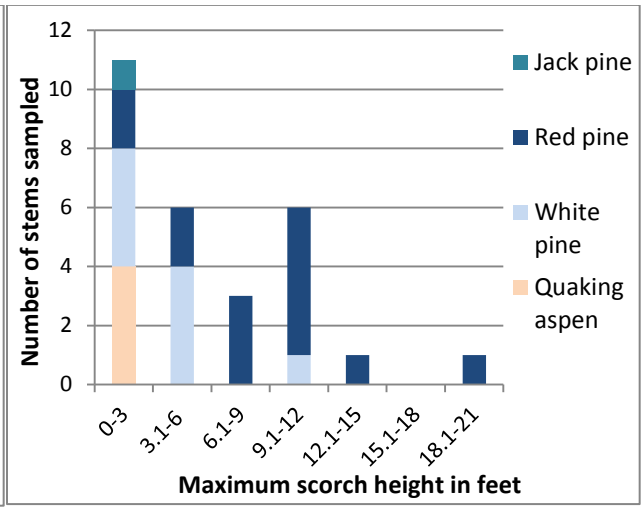


Figure 5. Maximum scorch height (ft) by tree species for burned plots.

Transect	Mean percent of live crown that burned (±SD, range)	Mean max. scorch height in burned plots (inches ±SD, range)
6	48.9 (±45.7, 0-100)	69.1 (±56.1, 1-144)
5	75.5 (±37.6, 5-99)	54.7 (±45.7, 6-114)
4	36.2 (±40.1, 0-100)	74 (±75.8, 6-240)
3	45 (1 tree)	60 (1 tree)

Table 5. Mean percent of live crown burned and mean maximum scorch height for trees in burned plots by transect.

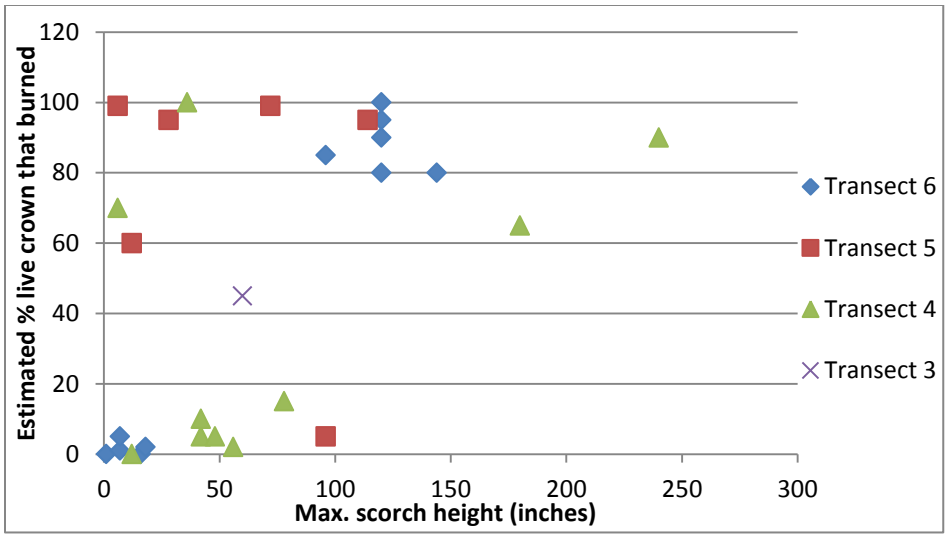
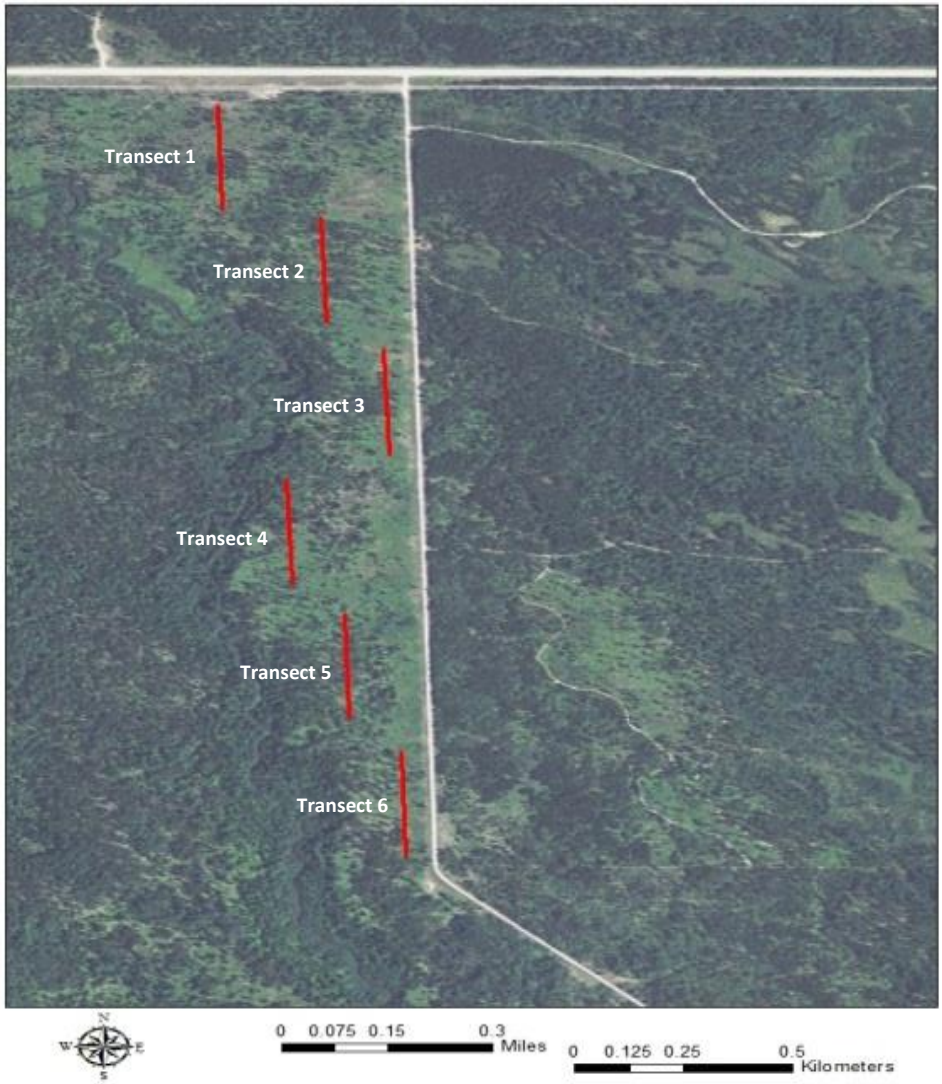


Figure 6. Estimated % live crown that burned vs. maximum scorch height for live trees within each burned transect.

Transects Associated with Post-Fire Monitoring on Driggs River Rd. (2014)



Map 1. Sampling area.